



ICC CODES - PUBLIC COMMENT FORM

FOR PUBLIC COMMENTS ON THE "2008 REPORT
OF THE PUBLIC HEARINGS"

PLEASE SEE BACK OF FORM FOR PROCEDURES ON SUBMITTING PUBLIC COMMENTS. ALL SUBMITTALS MUST
COMPLY WITH THESE PROCEDURES.

CLOSING DATE: All Comments Must Be Received by June 9, 2008. The 2008 Final Action Hearings will be held
September 17-23, 2008 in Minneapolis, Minnesota

1) Please type or print clearly: Public comments will be returned if they contain unreadable information.

Name:	Ronald Majette				Date:	June 9, 2008
Jurisdiction/Company:	U.S. Department of Energy					
Submitted on Behalf of:	U.S. Department of Energy					
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2) Copyright Release: In accordance with Council Policy #28 Code Development, all Code Change Proposals, Floor Modifications and Public Comments are required to include a copyright release. A copy of the copyright release form is included at the end of this form. Please follow the directions on the form. This form as well as an alternative release form can also be downloaded from the ICC website at www.iccsafe.org. If you have previously executed the copyright release, please check the box below:

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3) Code Change Proposal Number:

Indicate the Code Change Proposal Number that is being addressed by this Public Comment: EC64, Parts I and II

4) Public Comment: The Final Action requested on this Code Change Proposal is: (Check Box)

<input type="checkbox"/> Approved as Submitted (AS):	<input checked="" type="checkbox"/> X Approved as Modified by this Public Comment (AMPC):	<input type="checkbox"/> Approved as Modified by the Code Committee as Published in the ROH (AM):	<input type="checkbox"/> Approved as Modified by Assembly Floor Action as Published in the ROH (AMF):	<input type="checkbox"/> Disapproved (D):
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5) Proposed Modification (AMPC only):

Part 1: IECC

Modify proposal as follows:

SECTION 202

GENERAL DEFINITIONS

~~**AIR BARRIER.** Material(s) assembled and joined together to provide a barrier to air leakage through the building envelope. An air barrier may be a single material, or a combination of materials.~~

~~**402.4.2 Air sealing testing and insulation.** Building envelope air tightness and insulation installation shall be demonstrated to comply with one of the following options given by Section 402.4.2.1 or 402.4.2.2:~~

~~**402.4.2.1 Testing option.** Building envelope tightness and insulation installation shall be considered acceptable when tested air leakage is less than or equal to 7 ACH when tested with a blower door at a pressure of 50 pascals. Testing shall occur any time after rough in and after installation of penetrations of the building envelope, including penetrations for utilities, plumbing, electrical, ventilation, and combustion appliances.~~

~~During testing:~~

- ~~1. Exterior windows and doors, fireplace and stove doors shall be closed, but not sealed;~~
- ~~2. Dampers shall be closed, but not sealed; including exhaust, intake, makeup air, back draft, and flue dampers;~~
- ~~3. Interior doors shall be open;~~
- ~~4. Exterior openings for continuous ventilation systems and heat recovery ventilators shall be closed and sealed;~~
- ~~5. Heating and cooling system(s) shall be turned off; and~~
- ~~6. HVAC ducts shall not be sealed; and~~
- ~~7. Supply and return registers shall be open not be sealed.~~

402.4.2.2 Visual inspection option: Building envelope tightness and insulation installation shall be considered acceptable when the items listed in Table 402.4.2, applicable to the method of construction, are field verified. Where required by the code official, an approved party independent from the installer of the insulation, shall inspect the air barrier and insulation.

TABLE 402.4.2
AIR BARRIER AND INSULATION INSPECTION

COMPONENT	CRITERIA
Air barrier and thermal barrier	Exterior thermal envelope insulation for framed walls is installed in substantial contact and continuous alignment with building envelope air barrier. Breaks or joints in the air barrier are filled or repaired. Air permeable insulation is not used as a sealing material. Air permeable insulation is inside of an air barrier.
Ceiling / attic	Air barrier in any dropped ceiling / soffit is substantially aligned with insulation and any gaps are sealed. Attic access (except unvented attic), knee wall door, or drop-down stair is sealed.
Walls	Corners and headers are insulated. Junction of foundation and sill plate is sealed.
Windows and doors	Space between window/door jambs and framing is sealed.
Rim joists	Rim joists are insulated and include an air barrier.
Floors (including above garage and cantilevered floors)	Insulation is installed to maintain permanent contact with underside of subfloor decking. Air barrier is installed at any exposed edge of insulation.
Crawlspace walls	Insulation is permanently attached to walls. Exposed earth in unvented crawlspaces is covered with class I vapor retarder with overlapping joints taped.
Shafts, penetrations	Duct shafts, utility penetrations, knee walls, and flue shafts opening to exterior or unconditioned space are sealed.
Narrow cavities	Batts in narrow cavities are cut to fit, or narrow cavities are filled by sprayed/blown insulation.
Garage separation	Air sealing is provided between the garage and conditioned spaces.
Recessed lighting	Recessed light fixtures are airtight, IC rated, and sealed to drywall. Exception – fixtures in conditioned space.
Plumbing and Wiring	Insulation is placed between outside and pipes. Batt insulation is cut to fit around wiring and plumbing, or sprayed/blown insulation extends behind piping and wiring.
Shower / tub on exterior wall	Showers and tubs on exterior walls have insulation and an air barrier separating them from the exterior wall.
Electrical / phone box on exterior walls	Air barrier extends behind boxes or an air sealed type boxes are installed.
Common wall	Air barrier is installed in common wall between dwelling units.
HVAC register boots	HVAC register boots that penetrate building envelope are sealed to subfloor or drywall.
Fireplace	Fireplace walls include an air barrier.

402.4.3 Fireplaces. New wood-burning fireplaces shall have gasketed doors and outdoor combustion air.

403.7 Ventilation fans. Bathrooms and kitchens shall be provided with ventilation that meets the requirements of Section M1507.3 of the *International Residential Code*. Alternately, the code official may approve other means of ventilation.

PART II IRC

Modify proposal as follows:

SECTION R202

GENERAL DEFINITIONS

AIR BARRIER. Material(s) assembled and joined together to provide a barrier to air leakage through the building envelope. An air barrier may be a single material, or a combination of materials.

N1102.4.2 Air sealing testing and insulation. Building envelope air tightness and insulation installation shall be demonstrated to comply with one of the following options given by Section N1102.4.2.1 or N1102.4.2.2:

N1102.4.2.1 Testing option. Building envelope tightness and insulation installation shall be considered acceptable when tested air leakage is less than or equal to 7 ACH when tested with a blower door at a pressure of 50 pascals. Testing shall

occur any time after rough in and after installation of penetrations of the building envelope, including penetrations for utilities, plumbing, electrical, ventilation, and combustion appliances.

During testing:

1. Exterior windows and doors, fireplace and stove doors shall be closed, ~~but not sealed~~;
2. Dampers shall be closed, ~~but not sealed~~; including exhaust, intake, makeup air, back draft, and flue dampers;
3. Interior doors shall be open;
4. Exterior openings for continuous ventilation systems and heat recovery ventilators shall be closed ~~and sealed~~;
5. Heating and cooling system(s) shall be turned off; and
6. HVAC ducts shall ~~not be sealed~~; and
7. Supply and return registers shall be open ~~not be sealed~~.

N1102.4.2.2 Visual inspection option: Building envelope tightness and insulation installation shall be considered acceptable when the items listed in Table N1102.4.2, applicable to the method of construction, are field verified. Where required by the code official, an approved party independent from the installer of the insulation, shall inspect the air barrier and insulation.

TABLE N1102.4.2
AIR BARRIER AND INSULATION INSPECTION

COMPONENT	CRITERIA
Air barrier and thermal barrier	Exterior thermal insulation is installed in substantial contact and continuous alignment with building envelope air barrier. Breaks or joints in the air barrier are filled or repaired. Air permeable insulation is not used as a sealing material. Air permeable insulation is inside of an air barrier.
Ceiling / attic	Air barrier in any dropped ceiling / soffit is substantially aligned with insulation and any gaps are sealed. Attic access (except unvented attic), knee wall door, or drop down stair is sealed.
Walls	Corners and headers are insulated. Junction of foundation and sill plate is sealed.
Windows and doors	Space between window/door jambs and framing is sealed.
Rim joists	Rim joists are insulated and include an air barrier.
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Crawlspace walls	Insulation is permanently attached to walls. Exposed earth in unvented crawlspaces is covered with class I vapor retarder with overlapping joints taped.
Shafts, penetrations	Duct shafts, utility penetrations, knee walls, and flue shafts opening to exterior or unconditioned space are sealed.
Narrow cavities	Batts in narrow cavities are cut to fit, or narrow cavities are filled by sprayed/blown insulation.
Garage separation	Air sealing is provided between the garage and conditioned spaces.
Recessed lighting	Recessed light fixtures are airtight, IC rated, and sealed to drywall. Exception—fixtures in conditioned space.
Plumbing and Wiring	Insulation is placed between outside and pipes. Batt insulation is cut to fit around wiring and plumbing, or sprayed/blown insulation extends behind piping and wiring.
Shower / tub on exterior wall	Showers and tubs on exterior walls have insulation and an air barrier separating them from the exterior wall.
Electrical / phone box on exterior walls	Air barrier extends behind boxes or an air sealed type boxes are installed.
Common wall	Air barrier is installed in common wall between dwelling units.
HVAC register boots	HVAC register boots that penetrate building envelope are sealed to subfloor or drywall.
Fireplace	Fireplace walls include an air barrier.

N1102.4.3 Fireplaces. New wood-burning fireplaces shall have gasketed doors and outdoor combustion air.

N1103.7 Ventilation fans. Bathrooms and kitchens shall be provided with ventilation that meets the requirements of Section M1507.3. Alternately, the code official may approve other means of ventilation.

6) Reason (State the reason and justification to support the Public Comment. Include a bibliography of any substantiating material. It is the responsibility of the commenter to make the material available at the Final Action Hearing):

This proposal is intended to reduce the energy lost to infiltration and to improve insulation installation. The energy code

requirements for infiltration control have changed little in the last 15 years, except for the addition of recessed lighting specifications. This would be a substantial change that would lead to significant energy savings.

This proposal differs from the original proposal approved by the IECC committee by deleting the visual inspection option and requiring pressure testing of the building envelope. It is difficult to impossible to accurately check for all sources of potential leakage by visual inspection. Pressure testing is the only way to ensure an adequate level of sealing.

The proposal addresses all the reasons for disapproval provided by the IRC committee:

“This proposal would make it extremely difficult or impossible to achieve 7 ACH with a blower door test after rough in”. The proposal clarifies that the test can occur any time after rough in. Once the house is completed and all penetrations are sealed, the 7 ACH rate is not only possible, but is very reasonable. *“The issue of air quality needs to be addressed.”* The proposal now requires kitchen and bathroom ventilation as specified in the IRC. *“The test method is not stated”.* We believe the test method is adequately specified. *“Blower door”* envelope pressure tests have been widely used in Energy Star Homes for many years. *“The visual option would require returning to the site 5 or 6 times or obtain a third party and would be added expense for the local jurisdiction.”* The revision of the original proposal deletes the visual inspection option. The envelope pressurization test only needs to occur once.

In principal there are no infiltration leaks. Everything is supposed to be sealed. The IECC and IRC both say “all joints, seams and penetrations”, add a list of items, and to cover anything that was missed include “other sources of infiltration” are to be “sealed with an air barrier material ...” (IECC 402.4.1, IRC N1102.4.1). In practice energy losses from infiltration are large. Infiltration is 16% of the cooling load and 28% of the heating load (2006 Buildings Energy Data Book). Others have higher estimates.

Air infiltration requires air movement. Controlling air means enclosing air, eliminating big holes and paying attention to important details. This proposal requires a “blower door” test, a house pressurization test with a specified a maximum air leakage. The maximum is 7 ACH50, or 7 Air Changes per Hour at 50 pascals. The ACH50 is a common measurement made where doing air infiltration tests and therefore a reasonable metric for use in the code. ACH50 can be roughly translated into “natural air changes” by dividing by 20. Therefore the 7 ACH50 translated into a natural air change rate of 0.35.

This proposal retains proposed requires approved by the IECC committee for better performing fireplaces, including gasketed doors and outside combustion air, both for the energy savings and the indoor air quality. It also retains specifies kitchen and bathroom ventilation fans specified in the IRC for air quality.

Measured data shows a wide variation in the air tightness of individual homes. The biggest effect of this proposal would be to improve the underperforming half of new homes. (Nevada Study, Page 32; Washington State Study, Page 11; Wisconsin Study, Page 30) A secondary effect would be to improve the air sealing in most homes due to the increased attention to the important areas. Improved air sealing and better insulation installation is also likely to increase comfort, for example decreasing cold spots; and to improve the structures resistance to moisture problems.

The cost for a blower door test varies from about \$200 to perhaps \$400. The energy savings from reduced infiltration is harder to estimate. As noted already, summaries of infiltration measurements show large variations in the infiltration rates for actual homes, for example a study of infiltration measurements (LBNL study, page 2) showed the standard deviation in “normalized leakage area”, which relates directly to infiltration, was almost as big as the mean; therefore bringing the high infiltration homes down to average would be significant. The same study compared conventional new homes to energy efficient new homes and showed that reductions in air leakage of 40-50% are common in energy efficient homes (LBNL study, page 6). Based on the range of infiltration seen in new housing and the large reduction in infiltration in energy efficiency programs, it seems reasonable to estimate that this code change might produce a 10-30% the reduction in air infiltration rates with a similar reduction in energy costs for infiltration.

References:

David Hales. Washington State University Extension Energy Program. December 2001. *Washington State Energy Code Duct Leakage Study Report*. WSUCEEP01105. Olympia, WA.

Michelle Britt, Eric Makela. Britt/Makela Group. June 2003. *Final Report – Volume I, In-Field Residential Energy Code Compliance Assessment and Training Project*. Nevada State Office of Energy.

Scott Pigg and Monica Nevius. Energy Center of Wisconsin. November 2000. *Energy and Housing in Wisconsin: A Study of Single-Family Owner-Occupied Homes Volume 2: Data Book*. Research Report, 199-2

Max Sherman and Nance Matson. March 2002. *Air Tightness of New U.S. Houses: A Preliminary Report*. LBNL-48671. Lawrence Berkeley National Laboratory (LBNL) Berkeley, CA

US DOE. September 2006. 2006 Buildings Energy Data Book.
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